



Shell Exploration and Production

OCS/PSD Air Quality Permits
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January 3, 2013

**Re: Shell Gulf of Mexico, Inc. (Shell)
Noble Discoverer – Chukchi Sea
Application to Revise OCS PSD Permit to Construct No. R10OCS/PSD-AK-09-01**

This letter supplements Shell's November 29, 2012 application to revise Outer Continental Shelf Prevention of Significant Deterioration Permit to Construct No. R10OCS/PSD-AK-09-01. Shell requests that EPA revise Condition P.6 of the Permit to allow up to 24 supply ship events per season.

Basis for Request

Condition P.6 currently allows up to 8 supply ship visits each season:

6. **Supply Ship Events.** The total number of events during which the supply ship transits to and from the Discoverer and either attaches to the Discoverer or operates in dynamic positioning mode shall not exceed 8 in any drilling season. Each 24-hour period of operation in dynamic positioning mode is considered a separate supply ship event.

The 8-visit limit originated from the air quality modeling analysis supporting the 2010 permit application, which resulted in a permit remand. This analysis was, however, subsequently changed.

For the 2011 revised application, which led to the current final permit, Shell had revised the modeling analysis to reflect 24 supply ship visits. Although the modeling supported up to 24 resupply events, Shell's approach to the remand was to minimize the number of permit revisions being processed in order to expedite review. As a result, along with other potential revisions, Shell postponed requesting an increase in allowed supply ship visits from 8 to 24. All air quality modeling analyses submitted by Shell since 2011, including those submitted to support the November 29, 2012 revision application, have assumed 24 resupply events rather than 8.

EPA has already acknowledged for the record that the current air quality analysis assumes 24 resupply events:

The 2010 Permits restricted the number of resupply events to 8 in any rolling 12-month period. Although Shell assumed a total of 24 resupply events in its additional air quality analysis, Shell did not request an increase on the maximum number of resupply events.

(Statement of Basis, OCS PSD Permit to Construct No. R10OCS/PSD-AK-09-01, September, 2011, Section 3.12)

Shell is now requesting that this assumption be incorporated into the Permit by revising Condition P.6. Because all current analyses already assume 24 resupply visits, no additional air quality analysis is provided with this request.

Requested Revision

Shell requests that Condition P.6 be changed as follows (emphasis added for clarity):

6. **Supply Ship Events.** The total number of events during which the supply ship transits to and from the Discoverer and either attaches to the Discoverer or operates in dynamic positioning mode shall not exceed **24** in any drilling season. Each 24-hour period of operation in dynamic positioning mode is considered a separate supply ship event.

Based on information and belief formed after reasonable inquiry, I certify that the statements and information in this submission are true, accurate, and complete.

Please contact Pauline Ruddy (907-771-7243) or Chris Lindsey (907-771-7262) if you have any questions.



Susan Childs
Alaska Venture Support Integrator, Manager

cc: *Chris Lindsey, Shell*
Pauline Ruddy, Shell
Lance Tolson, Shell
Natasha Greaves, EPA Region 10



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January 24, 2013

**Re: Shell Gulf of Mexico Inc.
Noble Discoverer – Chukchi Sea
Application to Revise OCS PSD Permit to Construct No. R10OCS/PSD-AK-09-01**

On November 29, 2012, Shell Gulf of Mexico Inc. (Shell) submitted an application to revise Outer Continental Shelf Prevention of Significant Deterioration Permit to Construct No. R10OCS/PSD-AK-09-01 (Discoverer Chukchi permit). Since then, Shell has determined that an additional revision to the Discoverer Chukchi permit is required to accurately describe control devices installed on a secondary ice management vessel.

The Discoverer Chukchi permit is written to allow the use of one of two secondary ice management vessels to support the Noble Discoverer drillship (Discoverer): the Tor Viking or Hull 247 (Aiviq). Shell notified EPA that the Tor Viking would be used to support the Discoverer for operations during the 2012 drilling season, while the Aiviq would operate in the Beaufort Sea as a support vessel for Shell's Kulluk conical drill unit (Kulluk) in accordance with OCS Permit to Construct and Title V Air Quality Operating Permit No. R10OCS030000 (Kulluk Beaufort permit). Both permits allow for the flexibility of using either vessel for future drilling seasons.

The Discoverer Chukchi permit and the Kulluk Beaufort permit identify technologies and emissions limits. For particulate matter, carbon monoxide, and VOC emissions, the permits specify either oxidation catalysts or catalytic diesel particulate filters, depending on the engine. An oxidation catalyst is a flow-through device that achieves significant CO and VOC reductions and a modest reduction of the soluble organic fraction of PM. A diesel particulate filter (DPF) is a wall flow device used to trap particulate matter; it can be catalyzed to achieve additional reductions identical to an oxidation catalyst, and is then referred to as a catalytic diesel particulate filter (CDPF). A DPF or CDPF burns off trapped particulate matter through a process known as thermal regeneration which, as the name suggests, depends upon exhaust temperature. In general, CDPFs cost more and achieve greater PM reduction than oxidation catalysts.

The determination of which control option is required by the permit depended in part on cost effectiveness information provided in Shell's applications. This revision request is necessary because Shell chose to accept the additional cost associated with CDPFs on some engines even though an oxidation catalyst had been deemed adequate in the permits.

Prior Permit Revision Requests for Substitution of Catalytic Particulate Filters for Oxidation Catalyst Units

Shell has previously informed EPA of units that have been installed with CDPF rather than oxidation catalysts and proposed permit revisions to account for the substitutions in the following submittals:

- June 28, 2012 application to revise Outer Continental Shelf Prevention of Significant Deterioration Permit to Construct No. R10OCS/PSD-AK-09-01. The same request was included in the November 29, 2012 application in order to consolidate all recent permit revision requests.

- July 3, 2012 application for Minor Permit Modification to OCS Permit to Construct and Title V Air Quality Operating Permit No. R10OCS030000.

As is discussed further in the above submittals, CDPFs contain an oxidation catalyst and a filter membrane for more efficient removal of particulate matter than an oxidation catalyst alone, therefore satisfying the requirement of installing an oxidation catalyst, but with better particulate control. As confirmation that the CDPFs have better control efficiencies than oxidation catalysts, the control efficiencies for the three criteria pollutants affected by these types of controls that were used in the Discoverer Chukchi permit application are provided in Table 1. For all three pollutants the control efficiencies are either equal to or better with the CDPFs so the substitution is an improvement in emissions control.

Table 1: Control Effectiveness Used for Oxidation Catalysts and CDPFs			
Device	PM2.5	CO	VOC
Oxidation catalyst	50%	80%	70%
CDPF	85%	80%	90%

Consequently, EPA accepted the proposed permit revisions to allow CDPF in place of oxidation catalysts and incorporated them into our Administrative Compliance Order on Consent; effective September 7, 2012 and the Minor Modification to OCS Permit to Construct and Title V Air Quality Operating Permit No. R10OCS030000 effective September 28, 2012 for Discoverer and Kulluk operations, respectively.

Shell recently discovered that although we informed EPA that the Aiviq's non-propulsion engines are installed with CDPF in our application for the Minor Permit Modification to the Kulluk Beaufort permit, we neglected to identify the substitution in the Discoverer Chukchi permit revision requests. To maintain flexibility to use either vessel as our secondary ice management vessel for future drilling seasons, the Discoverer Chukchi permit must also be revised to include the substitution.

Installation of Catalyzed Diesel Particulate Filters

During the process of modifying the Discoverer and associated fleet to meet its permit requirements, Shell purchased and installed CDPFs rather than oxidation catalysts on several of the emission sources. The secondary ice management vessel emission units on which CDPFs were substituted are listed in Table 2.

Table 2: Icebreaker #2 Emission Units with CDPFs substituted for Oxidation catalysts		
Emission Unit	Permit-required Emission Controls	As-built Emission Controls
Aiviq Non-Propulsion Generator Engines	SCR, oxidation catalyst, CCV	E-POD (SCR, CDPF), CCV

Proposed Revisions to Discoverer Chukchi Permit

Due to the substitution of higher performing CDPF for oxidation catalyst control devices on the Aiviq non-propulsion generator engines, only one additional permit condition is required to be edited. Clean AIR E-POD systems are designed to combine SCR with oxidation catalysts or CDPFs. Therefore, substitution of CDPF in place of oxidation catalyst does not affect the Monitoring, Recordkeeping, and Reporting requirements for these emission units.

The following revision is suggested to the Discoverer Chukchi permit, additions in blue:

- O.2 **Operation of Oxidation Catalyst and Catalyzed Diesel Particulate Filter (CDPF).** At all times that any of the propulsion or generator engines on board Icebreaker #2 are in operation, the exhaust from each emission unit shall be directed to an operating oxidation catalyst **or a CDPF**.

Shell requests that EPA make this additional change to the terms of the permit to correct for the oversight in previous revision requests and to maintain the permit's intent to provide flexibility in the choice of secondary icebreaker vessel. No additional air quality analysis is needed because the control efficiencies of the CDPF are equal to or greater than the oxidation catalyst, and no changes to emission limits established to ensure compliance with National Ambient Air Quality Standards are proposed.

Based on information and belief formed after reasonable inquiry, I certify that the statements and information in this submission are true, accurate, and complete.

Please contact Pauline Ruddy (907-771-7243) or Chris Lindsey (907-771-7262) if you have any questions.

Thank you,



Susan Childs
Alaska Venture Support Integrator, Manager

Cc: Pauline Ruddy, Shell
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